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ABSTRACT

This study investigated two questions: what relationships exist between a teacher's knowledge of reading and the teacher's ability to solve problems in reading? and What effect does teacher effort have upon teacher knowledge and the teacher's problem-solving ability in reading tasks? Three instruments (the Artley-Hardin Inventory of Teacher Knowledge of Reading, the Powell-Stoll Problems in the Teaching of Reading test, and the Blair Teacher Effort Scale in Reading) were administered to 36 reading resource teachers in a school system in North Central Florida. From the data it was concluded that the three stage model of studying teacher proficiency has merit. There is clear evidence that there is a significant relationship between the teacher's knowledge in reading and the teacher's ability to solve problems in reading. The evidence in this study indicated little relationship between knowledge and problem-solving ability with teacher effort. It was recommended that teacher education programs redefine techniques for the diagnosis and prescription of teacher proficiency. (TS)

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A STUDY OF RELATIONSHIPS IN TEACHER PROFICIENCY

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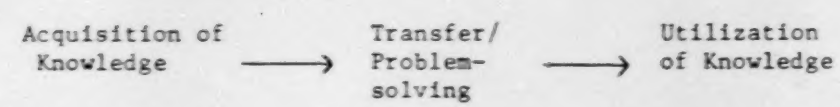
Proficiency in teaching reading may be conceptualized to be a three stage process: acquisition of knowledge, ability to transfer or apply knowledge to varied learning situations (generalizing or problem-solving), and utilization of knowledge in every day teaching tasks (Powell, 1969). The first two stages toward proficiency can be measured by paper and pencil tests designed to tap those functions. The third stage, utilization, has to be assessed through on-the-job observation and rating scales. Figure 1 below shows the directional flow for this model of proficiency attainment.

Figure 1. Proficiency Model



The first two stages of this three stage model are essentially the basis of this investigation, namely, what is the relationship between teacher knowledge of reading and teacher application of reading knowledge in simulated classroom reading tasks? Specifically, the questions were: (1) What relationships exist between teacher knowledge of reading and the teacher's ability to solve problems in reading? and (2)What effect does teacher effort have upon teacher knowledge and the teacher's problem-solving ability in reading tasks?

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This study was designed to measure and relate three variables: knowledge, problem-solving performance, and teacher effort. The knowledge component was measured by the Artley-Hardin Inventory of Teacher Knowledge of Reading (Artley, Hardin, 1971). The problem-solving dimension was assessed through the Powell-Stoll "Problems in the Teaching of Reading" (Stoll, 1971). The Blair "Teacher Effort Scale in Reading" was utilized to determine an estimate of teacher motivation in teaching reading. Each instrument will be briefly desribed below (Blair, 1975).

The Artley-Hardin Inventory of Teacher Knowledge of Reading is a test composed of 95 four-option multiple choice items. The authors state the test has a reliability index of .92. The areas of reading knowledge measured were partitioned into six separate skill areas for purposes of this investigation. They were: instructional goals (15 items), the directed reading activity (13 items), diagnosis and evaluation (22 items), comprehension (13 items), readiness (12 items), and word perception skills (20 items). These categories differ slightly from the content clusters suggested by the test authors. Research by Kingston, Brosier, and Hsu (1975) offers data supporting the validity of the Inventory, and the work of Edelman (1973) contends the results from scores on the Inventory are related to reading gain in children.

The Powell-Stoll "Problems in the Teaching of Reading" test was constructed on the original conceptual framework of Turner and Fattu (1961), who introduced problem-solving proficiency as a useful and valuable approach to creating instruments designed to assess specific

classroom teaching skills. Such an approach allows direct comparison of a teacher's performance in relation to other teachers by presenting controlled simulated situations in which the problems faced are the same for every teacher involved. Application of this concept has been accomplished by Wade (1960), Burnett (1961), Bradtmueller (1963), and Brown (1968).

The Powell-Stoll test is composed of two forms of nine distinct problem areas: placement levels, grouping, phonics, structural analysis, comprehension, directed reading activity, readability, test data interpretation, and classifying reading errors. The test assumes the presence of information on knowledge and asks the teacher to apply it to specific classroom reading tasks. The test has a total of 86 items and takes about 90 minutes to administer. The test has a reliability coefficient of equivalence of .96 and a Kuder-Richardson formula 20 index of .90. Stoll (1971) has shown a significant relationship exists between performance scores on this instrument and pupil gain in reading.

The Blair "Teacher Effort Scale in Reading" is a rating device used by an external observer (administrator, supervisor, etc.). It contains four sub-scales entailing effort to: variety of materials, differentiated instruction, teacher-initiated conferences, and record keeping. A reliability of .82 and .98 was obtained in two investigations using a split-half method corrected by the Spearman Brown Prophecy method. Blair (1975) found a significant relationship between the degree of effort in the job of teaching reading and children's achievement in reading.

The three instruments previously described were administered to 36 reading resource teachers in a school system in north central Florida. The Artley-Hardin test and the Powell-Stoll test were administered by the investigator of this study. The Blair instrument was sent to each principal or supervisor of the reading teacher included in this study for his or her completion and evaluation. While each of the teacher subjects was designated as a reading resource teacher in their respective schools, there was a wide range of training and experience in the group. Experience ranged from one year to many years in teaching, and the level of training varied from just over a bachelor's degree to a few with several graduate hours in reading past the master's degree.

The data from each test and its sub-tests were correlated with all other variables in the study. There were 22 variables: seven from the Artley-Hardin Inventory, ten from the Powell-Stoll problems test, and five from the effort scale. The intercorrelation matrix is shown in Table 1. Any coefficient of .33 or greater represents the .05 level of confidence, while a figure of .42 or greater is significant at the .01 level.

Place Table 1 about here

An inspection of the data reveals a significant relationship between the total knowledge score in reading and the ability to solve classroom reading problems. However, the relationships between these

two variables was .63; and while it is clearly significant well beyond the .01 level of confidence, the degree of strength between the two variables would only be considered to be moderate. A further analysis of the matrix will reveal that many of the sub-tests' correlations are low and/or not significant. For example, both the Artley-Hardin and the Powell-Stoll tests purport to measure the areas of the directed reading activity, comprehension, and word perception skills (phonics and structural analysis). Yet the relationship between knowledge and application of knowledge in these three skill areas was only .43, .28, and .54/.28, respectively. One would have normally hypothesized a higher degree of correspondence between knowledge in a given specific area and the generalizing of that knowledge into simulated classroom problems. However, an examination of the type and number of items in the two instruments might likely explain these levels of relationship.

The relationship between knowledge and effort was only .22, and between problem-solving ability and effort, only .26. Both correlations are very low and insignificant. A cautionary note must be extended here regarding the results of this instrument as used in this study. The investigator has the distinct impression that the scores on the Teacher Effort Scale as collected for this study should be held suspect. The mean scores on the sample in this investigation weresignificantly higher than the scores obtained by Blair (1975) in his validation study. The investigator has the clear impression that the principal (as in most of the cases) or the supervisor rating the teachers on the effort scale did not know well of their activities and scored the teachers using a global impression of them as a teacher,

rather than a specific observed knowledge of their teaching proficiency. Too many of the teachers were given unusually high ratings on the twelve items on the scale.

A factor analysis was performed on the 22 variables used in this study to determine the degree to which the instruments measured the separateness of components as suggested by the structure of their content. Eleven factors were found, and these eleven components accounted for 95 percent of the total score variance. The factors are shown in Table 2.

Place Table 2 about here

It is apparent from Table 2 that two factors emerged from the Artley-Hardin Inventory of Teacher Knowledge of Reading: one cluster consisting of the tests presumably measuring the areas of instructional goals, the directed reading activity, and diagnosis and evaluation content; the second cluster grouped together the areas of comprehension, readiness, and word perception skills. The first cluster might be labeled as a knowledge of the process characteristics of teaching reading, and the other factor called a knowledge of reading content (or product factors). However, this finding is in contrast to the study by Kingston, Brosier, and Hsu (1975), who found no identifiable clusters in the Inventory.

The Powell-Stoll "Problems in the Teaching of Reading" test produced eight identifiable clusters. These eight factors were: grouping, read-

ability, structural analysis, placement, test data interpretation and error classfication, comprehension, the directed reading activity, and phonics. In other words, of the nine sub-tests on the Powell-Stoll tests, only two sub-tests clustered together in this sample--the sub-test on test data interpretation and the sub-test dealing with classifying reading errors. Stoll (1971) in her original work found five separate factors using a much more heterogeneous population. Apparently there is much latent diagnostic power embedded within this instrument, as most sub-tests measure different aspects of the subject's ability to generalize upon their knowledge.

The Blair "Teacher Effort Scale in Reading" loaded totally in one separate but identifiable factor. While the results of this scale would only indicate a global score has interpretability, that score obviously is measuring something different than knowledge or the ability to solve problems. It estimates a distinct performance characteristic of its own.

The data presented here would indicate that the Artley-Hardin Inventory of Teacher Knowledge of Reading is a single or two-factor instrument which measures selected areas of reading knowledge. While the test may differentiate between levels of obtained knowledge in the reading area, it offers no diagnostic and prescriptive qualities, nor much information for self-evaluation and direction for improvement. Further, if application of knowledge is a criterion of performance, the scores from the Artley-Hardin offer little in the way of predictive power as to who will apply the knowledge they possess.

The Powell-Stoll instrument does measure teacher proficiency in

solving selected problems as might be encountered in a teaching situation. It shows a moderate relationship to teacher knowledge and has separate components which offer possible potential for diagnosis and prescription for teacher education programs.

The "Teacher Effort Scale in Reading" is a concept which merits further study. The data on this test as used in this study is suspect and only would indicate that further development and exploration should be maintained.

The data in this study would suggest that the three stage model of studying teacher proficiency has merit. It is possible to obtain measures of teacher performance in the knowledge domain, problem-solving or application areas, and estimates of teacher effort in a given performance area such as reading.

There is clear evicence that there is a significant and marked relationship between the teacher's knowledge in a given performance area and his/her ability to solve problems in that area. Support is given for the old adage that "one cannot teach (or apply) what one does not know." However, the moderate nature of this relationship would suggest an evaluation of information or knowledge taught and learned as it may have little or no applicability. Another age-old question persists: "What knowledge is worth knowing?"

The relationship of knowledge and problem-solving ability with teacher effort in a given area deserves further exploration. The evidence in this study indicates little relationship between these abilities. Yet, the utilization of knowledge would seem to demand that effort be extended to realize the potential of knowledge and

its application.

Teacher education programs in reading will need to refine techniques for the diagnosis and prescription of teacher proficiency. If instruments can be devised, developed, and refined to assess each stage of progress toward proficiency, then programs can be designed to meet the needs of teachers in various stages of development. As the growing trend toward increased in-service programs becomes necessary and the decreasing need for expanding pre-service programs continues, specificity in program planning for staff development becomes more crucial. Teachers become weary and critical of diffused in-service efforts. They want their specific needs met (although they may not know their own needs). Only when teacher education programs are directed to specific needs are such programs likely to be viewed positively by the participants and offer the concepts and principles which have the opportunity to change teacher behavior and presumably increase teaching proficiency.

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Tests and Index Numbers for Table 1

Artley-Hardin Inventory of Teacher Knowledge of Reading (A-H)

1. Instructional Goals
2. Directed Reading Activity (DRA)
3. Diagnosis and Evaluation
4. Comprehension
5. Readiness
6. Word Perception Skills
7. Total Knowledge Score (Sum of 1-6)

Powell-Stoll Problems in Teaching Reading (P-S)

8. Placement
9. Grouping
10. Phonics
11. Structural Analysis
12. Comprehension
13. Directed Reading Activity (DRA)
14. Readability
15. Test Data Interpretation
16. Classifying Reading Errors
17. Total Problem-Solving Score (Sum of 8-16)

Blair Teacher Effort Scale in Reading (B)

18. Variety of Materials
19. Differentiating Instruction
20. Teacher Initiated Conferences
21. Record Keeping
22. Total Effort Score (Sum of 18-21)

Table 1. Intercorrelations of Teacher Knowledge, Problem-Solving, and Effort Measures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	1.00	.65	.55	.35	.38	.52	.75	.16	.09	.54	.16	.05	.43	.13	.22	.30	.41	.07	.28	.40	.16	.19
2		1.00	.61	.29	.31	.48	.73	.05	.03	.33	.23	.11	.39	.06	.12	.24	.32	.23	.28	.45	-.06	.27
3			1.00	.57	.38	.53	.79	.08	-.06	.47	.37	.24	.43	.26	.42	.40	.54	.05	.11	.47	-.20	.13
4				1.00	.62	.67	.77	.30	.12	.47	.47	.28	.50	.23	.29	.48	.61	-.02	.09	.29	-.07	.09
5					1.00	.50	.68	.03	-.03	.27	.19	-.03	.26	.09	.11	.14	.21	-.16	.01	.01	-.19	-.10
6						1.00	.82	.15	.35	.54	.28	.27	.50	.08	.40	.61	.67	.30	.39	.37	.07	.33
7							1.00	.20	.13	.56	.36	.24	.53	.15	.36	.50	.63	.13	.26	.45	-.10	.22
8								1.00	.07	.03	.16	.19	.12	-.01	.12	.20	.32	.33	.47	.33	.12	.37
9									1.00	.47	.11	.18	.23	-.04	.17	.29	.50	.01	.14	-.13	.02	.01
10										1.00	.41	.09	.47	-.04	.34	.37	.66	-.04	.24	.40	-.01	.19
11											1.00	-.04	.42	-.06	.50	.17	.58	-.03	.02	.32	-.12	.06
12												1.00	.19	.30	.23	.30	.45	.07	.10	.15	.13	.14
13													1.00	-.11	.16	.23	.53	.07	.26	.21	-.24	.04
14														1.00	.34	.09	.25	-.01	.09	.27	.16	.17
15															1.00	.65	.77	.16	.22	.32	-.09	.18
16																1.00	.74	.29	.26	.27	-.14	.19
17																	1.00	.15	.34	.43	-.06	.26
18																		1.00	.73	.55	.57	.86
19																			1.00	.60	.40	.82
20																				1.00	.43	.80
21																					1.00	.76
22																						1.00

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Table 2. Sub-test Loadings from Factor Analysis of Teacher Knowledge, Problem-Solving, and Effort Measures

1	2	3	4
Instr. Goals (A-H) DRA (A-H) Diag. & Eval. (A-H)	Var. Materials (B) Diff. Instr. (B) Tchr. Conf. (B) Rec. Keeping (B)	Grouping (P-S)	Readability (P-S)
5	6	7	8
Structural Anal. (P-S)	Placement (P-S)	Test Interpret. (P-S) Class. Errors (P-S)	Comprehension (A-H) Readiness (A-H) Word Perception (A-H)
9	10	11	
Comprehension (P-S)	DRA (P-S)	Phonics (P-S)	